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APRIL 1976

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

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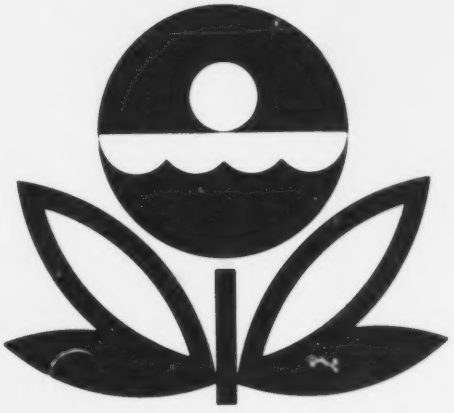

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT

ON

VERSAILLES LAKE

RIPLEY COUNTY

INDIANA

EPA REGION V

WORKING PAPER No. 343

WITH THE COOPERATION OF THE

INDIANA STATE BOARD OF HEALTH

AND THE

INDIANA NATIONAL GUARD

APRIL, 1976

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning {§303(e)}, water quality criteria/standards review {§303(c)}, clean lakes {§314(a,b)}, and water quality monitoring {§106 and §305(b)} activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Indiana State Board of Health for professional involvement, to the Indiana National Guard for conducting the tributary sampling phase of the Survey, and to those Indiana wastewater treatment plant operators who provided effluent samples and flow data.

The staff of the Division of Water Pollution Control, Indiana State Board of Health, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

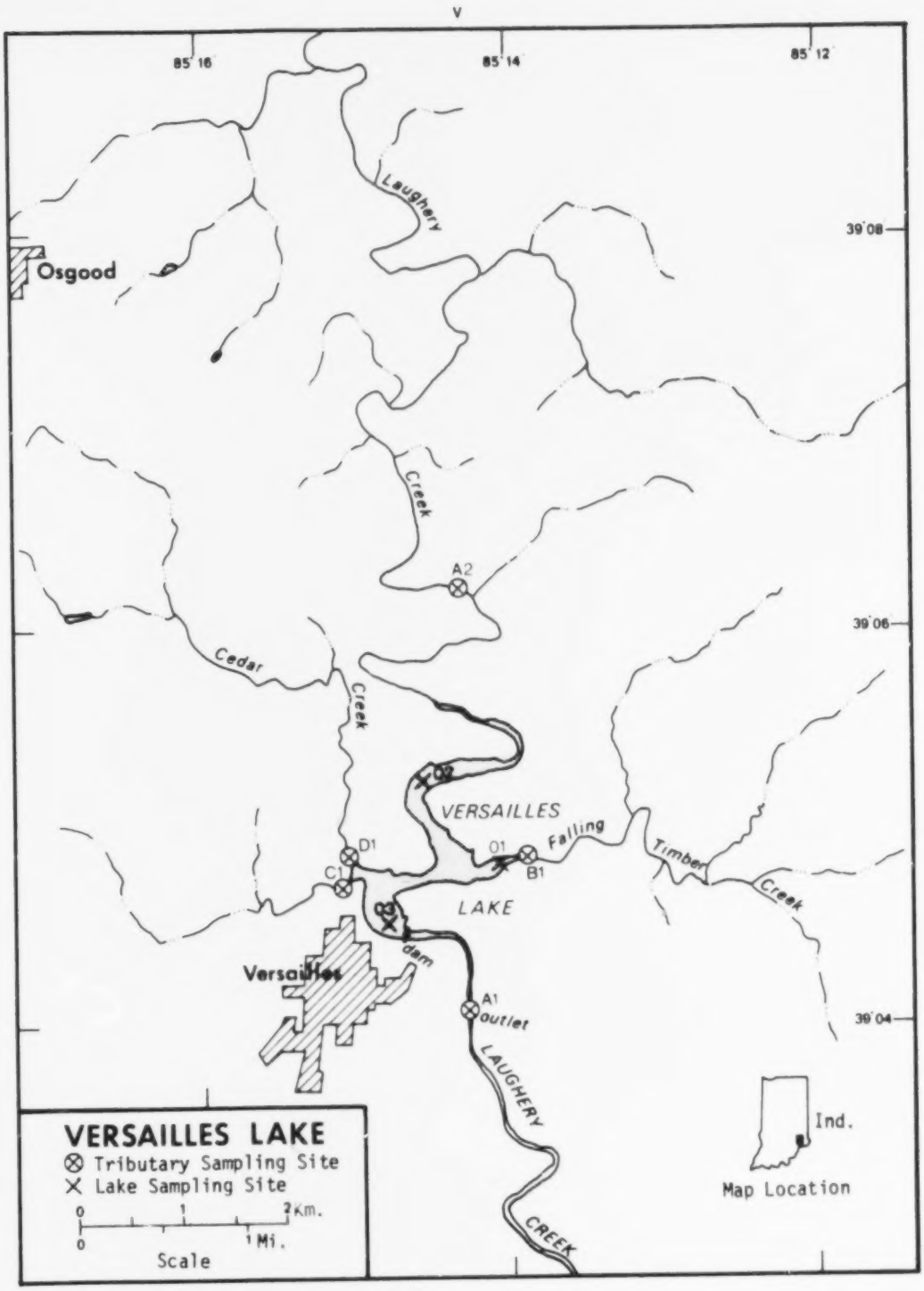
Major General Alfred F. Ahner, Adjutant General of Indiana, and Project Officers Lt. Colonel Charles B. Roberts (Retired) and Colonel Robert L. Sharp, who directed the volunteer efforts of the Indiana National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

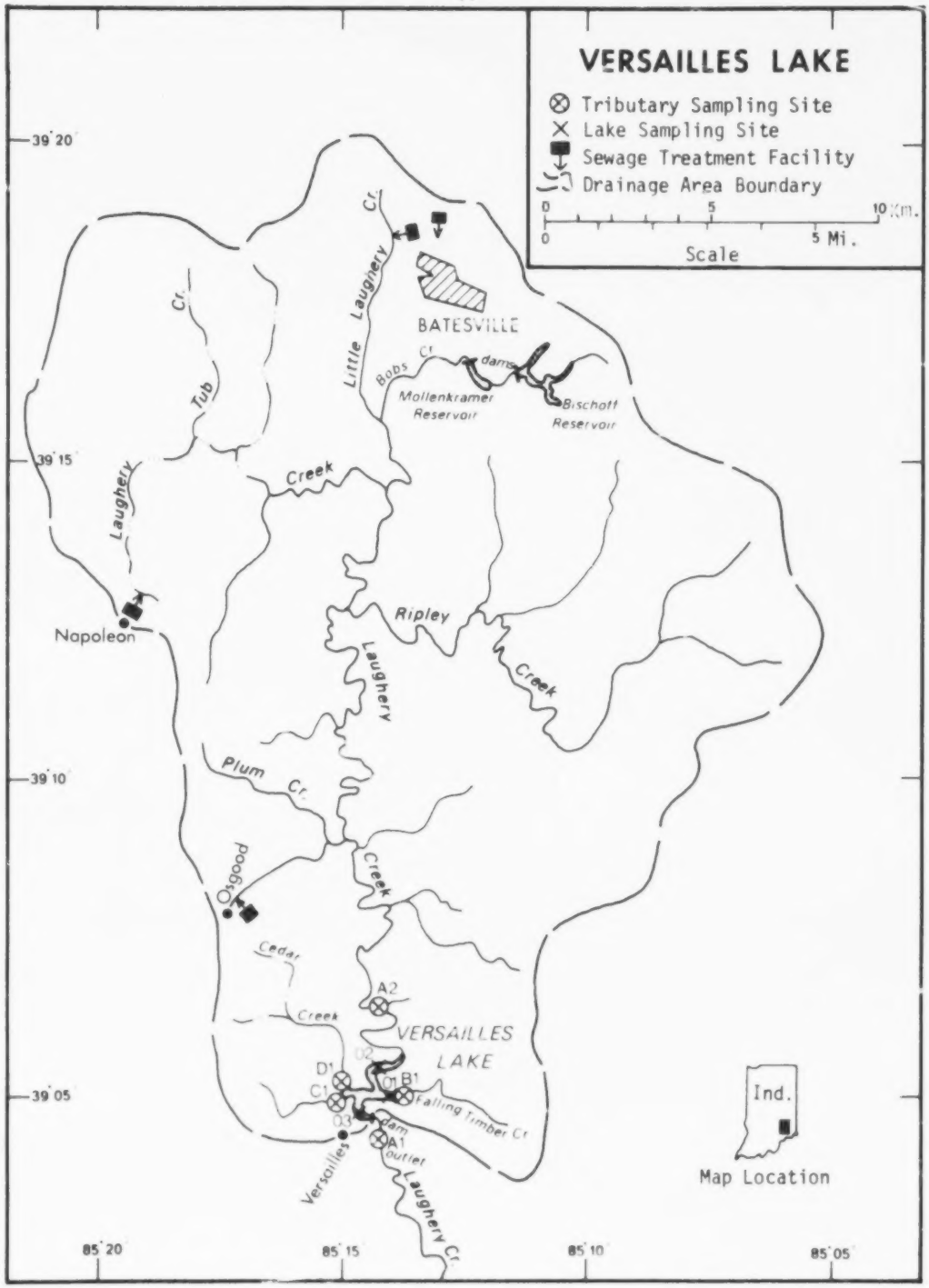
NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF INDIANA

LAKE NAME	COUNTY
Bass	Starke
Cataract	Owen, Putnam
Crooked	Steuben
Dallas	LaGrange
Geist	Hamilton, Marion
Hamilton	Steuben
Hovey	Posey
James	Kosciusko
James	Steuben
Long	Steuben
Marsh	Steuben
Mississinewa	Grant, Miami, Wabash
Maxinkuckee	Marshall
Monroe	Brown, Monroe
Morse	Hamilton
Olin	LaGrange
Oliver	LaGrange
Pigeon	Steuben
Sylvan	Noble
Tippecanoe	Kosciusko
Versailles	Ripley
Wawassee	Kosciusko
Webster	Kosciusko
Westler	LaGrange
Whitewater	Union
Winona	Kosciusko
Witmer	LaGrange


85°16'
85°14'
85°12'
39°08'
39°06'
39°04'
Laughery
Creek
Osgood
A2
Cedar
Creek
VERSAILLES
LAKE
D1
C1
O1
B1
Falling
Timber
Creek
dam
Versailles
A1
outlet
LAUGHERY
CREEK
VERSAILLES LAKE
Tributary Sampling Site
Lake Sampling Site
0 1 2Km.
0 1 Mi.
Scale
Ind.
Map Location


VERSAILLES LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
0 5 10 Km.
0 5 Mi.
Scale
39°20
39°15
39°10
39°05
85°20
85°15
85°10
85°05
Little Laughery Cr.
Cr.
Tub
Laughery
Creek
BATESVILLE
Bobs Cr.
dams
Mollenkramer Reservoir
Bischoff Reservoir
Napoleon
Ripley
Creek
Laughery
Creek
Plum Cr.
Osgood
Creek
Cedar
Creek
A2
VERSAILLES LAKE
D2
D1
B1
C1
D3
dam
A1
outlet
Falling Timber Cr.
Versailles
Laughery Cr.
Ind.
Map Location

VERSAILLES LAKE

STORET NO. 1850

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Versailles Lake is eutrophic. It ranked twenty-third in overall trophic quality when the 27 Indiana lakes sampled in 1973 were compared using a combination of six parameters*. Twenty-four of the lakes had less median total phosphorus, 22 had less median dissolved phosphorus, 18 had less median inorganic nitrogen, 19 had less mean chlorophyll a, and 25 had greater mean Secchi disc transparency. Near-depletion of dissolved oxygen with depth occurred at sampling station 3 in August and October.

Survey limnologists reported rooted aquatic vegetation along about 20% of the shoreline in August and October and some algae along the shore near station 1 in October.

B. Rate-Limiting Nutrient:

The algal assay results indicate that Versailles Lake was phosphorus limited at the time the sample was collected (04/29/73). The lake data indicate phosphorus limitation at the other sampling times as well.

C. Nutrient Controllability:

1. Point sources--The phosphorus contributions of known point sources amounted to 42.9% of the total reaching Versailles Lake

* See Appendix A.

during the sampling year. The communities of Batesville (39.7%), Osgood (2.7%), and Napoleon (0.5%) were the sources of these loads. However, the non-point phosphorus export rate of Laughery Creek was substantially higher than would be expected (see page 12). It is possible that additional point sources in the Batesville or Osgood municipal areas contributed significantly to the phosphorus load, the load from Napoleon may have been underestimated, or both.

The present phosphorus loading of 44.42 $g/m^2/yr$ is 20 times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 13). However, the mean hydraulic retention time of the lake probably is quite short (see page 4), and Vollenweider's model may not apply.

A 100% reduction in the phosphorus loads from the listed point sources would lower the overall loading rate to 25.37 $g/m^2/yr$. Because Versailles Lake is phosphorus limited, all phosphorus inputs should be minimized to the greatest practicable extent to slow the aging of this water body.

2. Non-point sources--About 57% of the total phosphorus input to Versailles Lake came from non-point sources during the sampling year. Laughery Creek contributed 55.4%; however, as discussed above, the phosphorus export rate of 58 $kg/km^2/yr$ was substantially higher than the rates of other tributaries in the drainage basin.

This may have been due in part to unknown point sources rather than to non-point source inputs. Other contributing gaged tributaries were Cedar Creek, 0.7%; Unnamed Stream C-1, 0.5%; and Falling Timber Creek, 0.3%. The ungaged tributaries were estimated to have contributed 0.2% of the overall phosphorus load.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 0.93 kilometers^2.
2. Mean depth: Unknown.
3. Maximum depth: 9.1 meters.
4. Volume: Unknown.
5. Mean hydraulic retention time: Unknown but probably is quite short; if the mean depth is equal to the maximum depth, the retention time would only be 24 days.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Laughery Creek	396.5	3.78
Falling Timber Creek	15.5	0.14
Unnamed Stream C-1	7.8	0.07
Cedar Creek	11.9	0.11
Minor tributaries & immediate drainage -	4.1	0.02
Totals	435.8	4.12

2. Outlet -

Laughery Creek	436.7**	4.12

C. Precipitation***:

1. Year of sampling: 128.3 centimeters.
2. Mean annual: 105.4 centimeters.

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† Table of metric conversions--Appendix B.
†† Winters, 1975.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Versailles Lake was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from a number of depths at three stations on the lake (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll *a* analysis. The maximum depths sampled were 0.9 meters at station 1, 1.5 meters at station 2, and 4.6 meters at station 3.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR VERSAILLES LAKE
STORET CODE 1850

PARAMETER	1ST SAMPLING (4/29/73) 3 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (8/ 2/73) 3 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (10/10/73) 3 SITES RANGE	MEAN	MEDIAN
TEMP (C)	13.5 - 14.3	14.0	14.0	22.8 - 24.9	24.4	24.7	21.2 - 22.4	21.7	21.6
DISS OXY (MG/L)	6.5 - 8.8	7.7	7.7	0.5 - 8.6	5.7	6.8	0.5 - 9.2	4.8	4.8
CNDCTVY (MCROMO)	300. - 350.	324.	330.	245. - 324.	279.	271.	309. - 323.	315.	315.
PH (STAND UNITS)	7.8 - 8.0	7.9	7.9	7.3 - 8.4	7.9	8.2	7.2 - 8.2	7.7	7.8
TOT ALK (MG/L)	118. - 139.	127.	126.	98. - 128.	110.	109.	136. - 146.	140.	139.
TOT P (MG/L)	0.173 - 0.230	0.194	0.193	0.087 - 0.180	0.118	0.115	0.089 - 0.139	0.108	0.108
ORTHO P (MG/L)	0.054 - 0.070	0.063	0.064	0.010 - 0.041	0.017	0.011	0.010 - 0.019	0.014	0.013
NO2+NO3 (MG/L)	1.000 - 1.300	1.129	1.100	0.750 - 0.850	0.802	0.810	0.030 - 0.050	0.042	0.040
AMMONIA (MG/L)	0.100 - 0.180	0.137	0.120	0.060 - 0.390	0.174	0.100	0.050 - 0.800	0.326	0.220
KJEL N (MG/L)	0.700 - 1.200	0.914	0.900	1.100 - 1.600	1.320	1.200	1.300 - 2.800	1.680	1.500
INORG N (MG/L)	1.160 - 1.420	1.266	1.220	0.830 - 1.140	0.976	0.930	0.080 - 0.840	0.368	0.260
TOTAL N (MG/L)	1.700 - 2.500	2.043	1.900	1.910 - 2.450	2.122	1.970	1.340 - 2.050	1.642	1.540
CHLRPYL A (UG/L)	3.2 - 19.8	11.0	9.9	4.9 - 64.7	32.9	29.1	22.6 - 41.3	31.4	30.2
SECCHI (METERS)	0.2 - 0.3	0.2	0.2	0.2 - 0.6	0.4	0.5	0.5 - 0.8	0.6	0.7

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
04/29/73	1. Cryptomonas sp.	1,292
	2. Oscillatoria sp.	775
	3. Centric diatoms	52
	4. Synedra sp.	34
	5. Navicula sp.	17
	Total	2,170
08/02/73	1. Stephanodiscus sp.	4,946
	2. Chroomonas sp.	1,371
	3. Flagellates	979
	4. Chlorogonium sp.	539
	5. Melosira sp.	196
	Other genera	1,763
	Total	9,794
10/10/73	1. Oscillatoria sp.	10,228
	2. Melosira sp.	3,133
	3. Centric diatoms	2,580
	4. Merismopedia sp.	1,843
	5. Cryptomonas sp.	1,659
	Other genera	4,607
	Total	24,050

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
04/29/73	1	3.2
	2	9.9
	3	19.8
08/02/73	1	64.7
	2	29.1
	3	4.9
10/10/73	1	30.2
	2	41.3
	3	22.6

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.050	1.280	19.7
0.050 P	0.100	1.280	22.6
0.050 P + 1.0 N	0.100	2.280	29.0
1.0 N	0.050	2.280	21.8

2. Filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.035	1.185	10.9
0.050 P	0.085	1.185	27.5
0.050 P + 1.0 N	0.085	2.185	30.3
1.0 N	0.035	2.185	13.2

3. Discussion -

The control yields of the assay alga, Selenastrum capricornutum, indicate that the potential primary productivity of Versailles Lake was high at the time the sample was collected (04/29/73). Both the autoclaved-filtered and filtered-only assays showed significant increases in yield with the addition of orthophosphorus alone, although smaller increases than would be expected. Note that the addition of nitrogen alone did not result in significantly increased yields as compared to the control; hence, phosphorus limitation is indicated.

The lake data indicate phosphorus limitation at all sampling times; i.e., the mean inorganic nitrogen/orthophosphorus ratios were 20/1 or greater.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Indiana National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page vi), except for the high runoff months of January and February when two samples were collected. Sampling was begun in June, 1973, and was completed in May, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Indiana District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in $kg/km^2/year$, at stations B-1, C-1, and D-1 and multiplying the means by the ZZ area in km^2.

The operators of the Osgood and Batesville wastewater treatment plants provided monthly effluent samples and corresponding flow data. The community of Napoleon did not participate in the Survey; nutrient loads from this source were estimated at 0.567 kg P and 3.401 kg N/capita/year, and flows were estimated at 0.3785 m^3/capita/day.

* See Working Paper No. 175.

All estimated phosphorus loads were reduced by 50% to adjust for a phosphate detergent limitati in effect in Indiana since January, 1972.

A. Waste Sources:

1. Known municipal† -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Batesville #1	4,000	tr. filter	1,097.8	Little Laughery Creek
Batesville #2		act. sludge	1,047.3	Little Laughery Creek
Osgood	1,500	tr. filter + P-removal*	662.4	Branch of Plum Creek
Napoleon	400**	stab. pond	151.4	Laughery Creek

2. Known industrial - None

† Treatment plant questionnaires.
* Begun in November, 1974.
** Anonymous, 1971.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Laughery Creek	22,875	55.4
Falling Timber Creek	140	0.3
Unnamed Stream C-1	195	0.5
Cedar Creek	285	0.7
b. Minor tributaries & immediate drainage (non-point load) -	80	0.2
c. Known municipal STP's -		
Batesville #1	9,920	24.0
Batesville #2	6,475	15.7
Osgood	1,100	2.7
Napoleon	225	0.5
d. Septic tanks* -	<5	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	15	<0.1
Total	41,315	100.0

2. Outputs -

Lake outlet - Laughery Creek 28,700

3. Net annual P accumulation - 12,615 kg.

* Estimate based on two camps and one park; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (non-point load) -		
Laughery Creek	302,320	89.9
Falling Timber Creek	4,785	1.4
Unnamed Stream C-1	3,690	1.1
Cedar Creek	7,445	2.2
b. Minor tributaries & immediate drainage (non-point load) -	1,925	0.6
c. Known municipal STP's -		
Batesville #1	5,430	1.6
Batesville #2	4,215	1.3
Osgood	3,875	1.2
Napoleon	1,360	0.4
d. Septic tanks* -	175	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	1,005	0.3
Total	336,225	100.0

2. Outputs -

Lake outlet - Laughery Creek 353,070

3. Net annual N loss - 16,845 kg.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Laughery Creek	58	762
Falling Timber Creek	9	309
Unnamed Stream C-1	25	473
Cedar Creek	24	626

* Estimate based on two camps and one park; see Working Paper No. 175.
** See Working Paper No. 175.

E. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	44.42	13.56	361.5	loss*

Vollenweider phosphorus loadings ($g/m^2/yr$) based on surface area and mean outflow of Versailles Lake:

"Dangerous" (eutrophic loading)	2.20
"Permissible" (oligotrophic loading)	1.10

* There was an apparent nitrogen loss during the sampling year. This may have been due to nitrogen fixation in the lake, solubilization of previously sedimented nitrogen, recharge with nitrogen-rich ground water, unknown and unsampled point sources discharging directly to the lake, or (probably) insufficient sampling in relation to the short hydraulic retention time of the lake (see page 4). Whatever the cause, a similar nitrogen loss has occurred at Shagawa Lake, Minnesota, which has been intensively studied by EPA's former National Eutrophication and Lake Restoration Branch (Malueg et al., 1975).

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VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN OD	MEDIAN DISS INTRO P
1805	CATAWACT LAKE	0.050	1.000	466.667	15.744	15.000	0.013
1811	GEIST RESERVOIR	0.074	1.040	472.500	45.950	11.600	0.009
1817	JAMES LAKE	0.024	1.030	434.000	11.533	15.000	0.006
1827	MISSISSINEWA RESERVOIR	0.107	2.400	473.444	15.778	15.000	0.024
1828	MONROE RESERVOIR	0.025	0.325	438.823	6.947	15.000	0.007
1829	MORSE RESERVOIR	0.084	3.325	473.222	56.167	15.000	0.009
1836	WAWASEE LAKE	0.012	0.210	384.500	5.000	14.600	0.003
1837	WEBSTER LAKE	0.025	0.790	431.000	11.500	15.000	0.005
1839	WHITEWATER LAKE	0.084	1.620	470.167	33.083	15.000	0.012
1840	WINONA LAKE	0.035	1.250	444.667	11.211	15.000	0.011
1841	WESTLEW LAKE	0.035	0.860	427.125	10.712	15.000	0.013
1842	WITMER LAKE	0.035	0.900	440.333	11.917	15.000	0.011
1843	LAKE MAXINKUCKEE	0.020	0.220	400.400	5.483	15.000	0.003
1844	TIPPECANOE LAKE	0.014	0.195	391.500	6.050	15.000	0.005
1845	DALLAS LAKE	0.024	0.830	413.333	10.067	15.000	0.014
1846	OLIN LAKE	0.012	1.460	403.333	4.867	14.900	0.003
1847	OLIVER LAKE	0.004	0.920	392.000	3.767	14.800	0.004
1848	SYLVAN LAKE	0.170	0.130	484.833	47.480	14.800	0.017
1849	HOVEY LAKE	0.052	1.050	489.333	84.267	7.600	0.024
1850	VERSAILLES LAKE	0.139	1.090	482.000	25.078	14.500	0.019
1851	BASS LAKE	0.040	0.250	471.375	29.367	7.000	0.012
1852	CROOKED LAKE	0.014	0.120	410.111	5.578	15.000	0.005
1853	LAKE JAMES	0.018	0.190	352.444	4.856	15.000	0.005
1854	LONG LAKE	0.204	1.920	442.667	16.130	15.000	0.150
1855	PIGEON LAKE	0.058	1.995	442.667	11.900	15.000	0.015
1856	MARSH LAKE	0.041	0.270	451.333	14.467	15.000	0.055
1857	HAMILTON LAKE	0.033	0.720	413.167	17.450	15.000	0.018

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
1805	CATARACT LAKE	37 (9)	15 (4)	31 (8)	62 (16)	35 (0)	37 (9)	217
1811	GEIST RESERVOIR	27 (7)	35 (9)	15 (4)	12 (3)	92 (24)	62 (16)	243
1817	JAMES LAKE	73 (19)	42 (11)	58 (15)	50 (13)	35 (0)	65 (17)	323
1827	MISSISSINEWA RESERVOIR	12 (3)	4 (1)	8 (2)	38 (10)	35 (0)	8 (2)	105
1828	MONROE RESERVOIR	67 (17)	69 (18)	54 (14)	73 (19)	35 (0)	69 (18)	367
1829	MORSE RESERVOIR	23 (6)	0 (0)	12 (3)	4 (1)	35 (0)	58 (15)	132
1836	WAWASEE LAKE	94 (24)	85 (22)	96 (25)	88 (23)	85 (22)	98 (25)	546
1837	WEBSTER LAKE	67 (17)	62 (16)	62 (16)	54 (14)	35 (0)	81 (21)	361
1839	WHITEWATER LAKE	19 (5)	19 (5)	23 (6)	19 (5)	35 (0)	42 (11)	157
1840	WINONA LAKE	50 (12)	27 (7)	38 (10)	58 (15)	35 (0)	52 (13)	260
1841	WESTLER LAKE	50 (12)	54 (14)	65 (17)	65 (17)	35 (0)	37 (9)	306
1842	WITMER LAKE	50 (12)	50 (13)	50 (13)	42 (11)	35 (0)	52 (13)	279
1843	LAKE MAXINKUCKEE	77 (20)	81 (21)	85 (22)	85 (22)	35 (0)	98 (25)	461
1844	TIPPECANOE LAKE	85 (22)	88 (23)	92 (24)	77 (20)	35 (0)	85 (22)	462
1845	DALLAS LAKE	62 (16)	58 (15)	69 (18)	69 (18)	35 (0)	31 (8)	324
1846	OLIN LAKE	94 (24)	23 (6)	81 (21)	92 (24)	73 (19)	92 (24)	455
1847	OLIVER LAKE	100 (26)	46 (12)	88 (23)	100 (26)	79 (20)	88 (23)	501
1848	SYLVAN LAKE	4 (1)	96 (25)	27 (7)	8 (2)	79 (20)	23 (6)	237
1849	HOVEY LAKE	31 (8)	38 (10)	0 (0)	0 (0)	96 (25)	12 (3)	177
1850	VERSAILLES LAKE	8 (2)	31 (8)	4 (1)	27 (7)	88 (23)	15 (4)	173
1851	BASS LAKE	42 (11)	77 (20)	19 (5)	23 (6)	100 (26)	46 (12)	307
1852	CROOKED LAKE	81 (21)	100 (26)	77 (20)	81 (21)	35 (0)	75 (19)	449
1853	LAKE JAMES	88 (23)	92 (24)	100 (26)	96 (25)	35 (0)	75 (19)	486
1854	LONG LAKE	0 (0)	12 (3)	44 (11)	35 (9)	35 (0)	0 (0)	126
1855	PIGEON LAKE	37 (9)	8 (2)	44 (11)	46 (12)	35 (0)	27 (7)	197
1856	MARSH LAKE	15 (4)	73 (19)	35 (9)	15 (4)	35 (0)	4 (1)	177
1857	HAMILTON LAKE	58 (15)	65 (17)	73 (19)	31 (8)	35 (0)	19 (5)	281

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	1836	WAWASEE LAKE	546
2	1847	OLIVER LAKE	501
3	1853	LAKE JAMES	486
4	1844	TIPPECANOE LAKE	462
5	1843	LAKE MAXINKUCKEE	461
6	1846	OLIN LAKE	455
7	1852	CROOKED LAKE	449
8	1828	MONROE RESERVOIR	367
9	1837	WEBSTER LAKE	361
10	1845	DALLAS LAKE	324
11	1817	JAMES LAKE	323
12	1851	BASS LAKE	307
13	1841	WESTLER LAKE	306
14	1857	HAMILTON LAKE	281
15	1842	WITMER LAKE	279
16	1840	WINONA LAKE	260
17	1811	GEIST RESERVOIR	243
18	1848	SYLVAN LAKE	237
19	1885	CATARACT LAKE	217
20	1855	PIGEON LAKE	197
21	1856	MARSH LAKE	177
22	1849	HOVEY LAKE	177
23	1850	VERSAILLES LAKE	173
24	1839	WHITEWATER LAKE	157
25	1829	MORSE RESERVOIR	132
26	1854	LONG LAKE	126
27	1827	MISSISSINEWA RESERVOIR	105

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR INDIANA 03/29/76

LAKE CODE 1850 VERSAILLES

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 434.9

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1850A1	436.7	5.72	6.37	8.69	8.30	5.47	4.05	2.53	1.11	0.95	1.06	2.15	3.77	4.17
1850A2	396.5	5.18	5.78	7.90	7.53	4.96	3.68	2.29	1.00	0.86	0.96	1.95	3.43	3.78
1850B1	15.5	0.178	0.221	0.320	0.297	0.190	0.147	0.088	0.026	0.027	0.027	0.076	0.144	0.145
1850C1	7.8	0.088	0.110	0.161	0.150	0.093	0.074	0.042	0.012	0.013	0.013	0.037	0.074	0.072
1850D1	11.9	0.136	0.170	0.246	0.227	0.144	0.113	0.065	0.020	0.020	0.020	0.059	0.110	0.111
1850ZZ	2.2	0.023	0.031	0.045	0.042	0.026	0.021	0.012	0.003	0.003	0.003	0.010	0.021	0.020

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 434.9
SUM OF SUB-DRAINAGE AREAS = 433.9

TOTAL FLOW IN = 49.69
TOTAL FLOW OUT = 50.16

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1850A1	6	73	7.815	9	1.501				
	7	73	13.394	13	0.651				
	8	73	0.283	17	0.164				
	9	73	0.054	17	0.034				
	10	73	0.595	15	0.283				
	11	73	6.201	16	1.614				
	12	73	4.927	21	6.881				
	1	74	12.120	17	16.282	29	12.771		
	2	74	6.003	15	1.869	20	7.277		
	3	74	8.382	15	6.400				
	4	74	14.272	19	1.642				
	5	74	8.212	26	1.642				
1850A2	6	73	7.192	9	1.812				
	7	73	12.091	13	0.963				
	8	73	0.510	17	0.340				
	9	73	0.147	17	0.099				
	10	73	0.906	15	0.510				
	11	73	5.663	16	1.926				
	12	73	4.559	21	6.626				
	1	74	11.072	17	14.951	29	11.638		
	2	74	5.465	15	2.152	20	6.626		
	3	74	7.617	15	5.890				
	4	74	12.941	19	1.926				
	5	74	7.476	26	1.416				

TRIBUTARY FLOW INFORMATION FOR INDIANA 03/29/76

LAKE CODE 1850 VERSAILLES

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1850B1	6	73	0.283	9	0.042				
	7	73	0.481	13	0.014				
	8	73	0.006	17	0.003				
	9	73	0.001	17	0.000				
	10	73	0.014	15	0.003				
	11	73	0.218	16	0.045				
	12	73	0.176	21	0.023				
	1	74	0.425	17	0.566	29	0.453		
	2	74	0.210	15	0.054	20	0.255		
	3	74	0.283	15	0.198				
	4	74	0.510	19	0.045				
	5	74	0.283	26	0.031				
1850C1	6	73	0.139	9	0.028				
	7	73	0.238	13	0.011				
	8	73	0.006	17	0.003				
	9	73	0.001	17	0.001				
	10	73	0.011	15	0.003				
	11	73	0.110	16	0.028				
	12	73	0.088	21	0.125				
	1	74	0.215	17	0.283	29	0.227		
	2	74	0.108	15	0.034	20	0.127		
	3	74	0.150	15	0.113				
	4	74	0.255	19	0.028				
	5	74	0.167	26	0.020				
1850D1	6	73	0.042	9	0.008				
	7	73	0.071	13	0.003				
	8	73	0.002	17	0.001				
	9	73	0.000	17	0.000				
	10	73	0.003	15	0.001				
	11	73	0.034	16	0.008				
	12	73	0.025	21	0.040				
	1	74	0.065	17	0.088	29	0.068		
	2	74	0.031	15	0.011	20	0.037		
	3	74	0.042	15	0.034				
	4	74	0.076	19	0.008				
	5	74	0.042	26	0.006				
1850ZZ	6	73	0.040	9	0.008				
	7	73	0.068	13	0.003				
	8	73	0.001	17	0.001				
	9	73	0.000	17	0.000				
	10	73	0.003	15	0.001				
	11	73	0.031	16	0.008				
	12	73	0.025	21	0.034				
	1	74	0.059	17	0.082	29	0.062		
	2	74	0.031	15	0.008	20	0.037		
	3	74	0.042	15	0.031				
	4	74	0.071	19	0.008				
	5	74	0.040	26	0.008				

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/03/30

185001
39 04 52.0 085 14 05.0 3
VERSAILLES LAKE
18137 INDIANA

052192

11EPALES 2111202
0007 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/29	13 45	0000	14.3		8	330	7.90	126	0.120	1.100	1.100	0.064
	13 45	0003	14.0	8.8		310	8.00	128	0.100	0.700	1.100	0.066
73/08/02	12 00	0000	24.9	8.6	20	285	8.20	109	0.100	1.500	0.030	0.010
73/10/10	10 00	0000	21.6	8.6	28	309	7.80	136	0.070	2.000	0.050	0.012

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DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/29	13 45	0000	0.197	3.2
	13 45	0003	0.176	
73/08/02	12 00	0000	0.119	64.7
73/10/10	10 00	0000	0.109	30.2

STORET RETRIEVAL DATE 76/03/30

185002
39 05 15.0 085 14 35.0 3
VERSAILLES LAKE
18137 INDIANA

052192

11EPALES 2111202
0007 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/29	13	15 0000	14.0		10	330	8.00	134	0.120	1.200	1.300	0.070
	13	15 0005	13.9	8.8		350	8.00	139	0.110	1.000	1.300	0.066
73/08/02	12	15 0000	24.5	5.6	8	324	7.60	128	0.240	1.600	0.050	0.012
73/10/10	10	10 0000	22.4	9.2	18	319	8.20	139	0.080	1.300	0.040	0.013

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/29	13	15 0000	0.189	9.9
	13	15 0005	0.203	
73/08/02	12	15 0000	0.115	29.1
73/10/10	10	10 0000	0.108	41.3

92

STORET RETRIEVAL DATE 76/03/30

185003
39 04 32.0 085 14 48.0 3
VERSAILLES LAKE
18137 INDIANA

052192

11EPALES 2111202
0019 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/29	14 00	0000	14.1			315	7.90	118	0.160	0.900	1.000	0.060
	14 00	0003	13.9	6.6		300	7.90	118	0.170	0.700	1.000	0.058
	14 00	0015	13.5	6.5		330	7.80	126	0.180	0.800	1.100	0.054
73/08/02	12 25	0000	24.9		22	271	8.40	112	0.060	1.200	0.770	0.011
	12 25	0005	24.7	8.0		270	8.20	104	0.080	1.100	0.810	0.011
	12 25	0015	22.8	0.5		245	7.30	98	0.390	1.200	0.750	0.041
73/10/10	10 25	0000	22.0		30	311	7.90	137	0.050	1.400	0.030	0.010
	10 25	0005	21.4	1.0		315	7.30	143	0.220	1.500	0.040	0.014
	10 25	0012	21.2	0.5		323	7.20	146	0.490	1.800	0.050	0.019

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/29	14 00	0000	0.173	19.8
	14 00	0003	0.193	
	14 00	0015	0.230	
73/08/02	12 25	0000	0.091	4.9
	12 25	0005	0.087	
	12 25	0015	0.180	
73/10/10	10 25	0000	0.094	22.6
	10 25	0005	0.089	
	10 25	0012	0.139	

APPENDIX E

TRIBUTARY DATA

STORET RETRIEVAL DATE 76/03/30

1850A1
39 04 05.0 085 14 16.0 4
LAUGHERY CREEK
18 7.5 MILAN
O/VERSAILLS 052192
COVERED BRDG E OF VERSAILLES
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/09	10 00		0.294	1.600	0.019	0.023	0.145
73/07/13	09 40		0.820	1.980	0.115	0.023	0.115
73/08/17	11 12		0.810	1.100	0.240	0.110	0.180
73/09/17	09 25		0.760	1.800	0.550	0.260	0.410
73/10/15	10 50		0.410	1.500	0.460	0.180	0.260
73/11/16	10 55		0.384	0.850	0.044	0.044	0.110
73/12/21	13 30		1.760	0.800	0.144	0.184	0.250
74/01/17	15 00		1.900	0.900	0.144	0.132	0.300
74/01/29	10 05		1.440	1.500	0.065	0.085	0.320
74/02/15	10 00		1.700	1.000	0.105	0.115	0.210
74/02/20	11 10		1.760	1.700	0.095	0.115	0.320
74/03/15	10 00		1.520	1.300	0.075	0.100	0.175
74/04/19	10 30		0.970	0.900	0.050	0.025	0.050
74/05/26	13 50		1.600	1.600	0.035	0.010	0.185

STORET RETRIEVAL DATE 76/03/30

1850A2
39 06 13.0 085 14 16.0 4
LAUGHERY CREEK
18 7.5 MILAN
I/VERSAILLS 052192
BANK AT END OF SEC RD
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/09	10 10		1.700	1.540	0.055	0.139	0.300
73/07/13	09 15		0.810	1.540	0.018	0.058	0.200
73/08/17	10 50		0.013	0.980	0.023	0.055	0.145
73/09/17	08 55		0.010K	1.050	0.036	0.058	0.160
73/10/15	10 20		0.013	1.050	0.038	0.930	1.150
73/11/16	10 30		0.384	1.950	0.096	0.330	0.540
74/01/17	14 30		4.500	1.200	0.116	0.112	0.270
74/01/29	09 30		0.920	1.000	0.060	0.060	0.240
74/02/15	09 25		2.000	1.300	0.115	0.240	0.480
74/02/20	10 40		2.000	1.600	0.105	0.240	0.470
74/03/15	09 30		1.800	1.100	0.050	0.095	0.160
74/04/19	10 10		0.720	0.900	0.045	0.015	0.050
74/05/26	13 30		1.500	1.500	0.045	0.015	0.230

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/30

185081
39 04 50.0 085 13 55.0 4
FALLING TIMBER CREEK
18 7.5 MILAN
T/VERSAILLS 052192
BANK ALONG TRAIL JUST ABOVE MOUTH
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/09	11 05		0.016	0.665	0.029	0.010	0.015
73/07/13	10 05		0.058	0.480	0.038	0.010	0.017
73/08/17	12 30		0.010K	0.880	0.033	0.005K	0.019
73/09/17	09 50		0.011	0.460	0.069	0.014	0.080
73/10/15	11 00		0.035	0.550	0.024	0.026	0.055
73/11/16	11 10		0.022	0.250	0.017	0.016	0.025
74/01/17	15 30		2.300	0.400	0.028	0.020	0.055
74/01/29	10 20		0.616	0.300	0.020	0.010	0.020
74/02/15	10 20		0.690	0.600	0.015	0.010	0.030
74/02/20	11 25		0.690	1.300	0.115	0.015	0.045
74/03/15	10 10		0.368	0.500	0.015	0.005	0.012
74/04/19	10 45		0.068	0.450	0.030	0.005K	0.005
74/05/26	14 10		0.032	0.300	0.025	0.020	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/30

1850C1
39 04 44.0 085 15 05.0 4
UNNAMED STREAM
18 7.5 VERSAILLES
T/VERSAILLS 051892
BANK NEAR MOUTH WALK FROM END OF SEC RD
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/09	11 35		0.086	0.820	0.056	0.023	0.045
73/07/13	10 30		0.073	0.520	0.008	0.022	0.065
73/08/17	12 00		0.048	0.250	0.019	0.036	0.050
73/09/17	10 30		0.056	0.800	0.039	0.028	0.040
73/10/15	11 55		0.026	3.150	0.105	0.033	0.080
73/11/16	12 00		0.240	1.200	0.029	0.020	0.195
74/01/17	14 15		1.260	0.500	0.088	0.076	0.135
74/01/29	11 15		1.700	0.600	0.015	0.090	0.230
74/02/15	11 05		0.830	1.300	0.085	0.015	0.060
74/02/20			0.810	2.200	0.280	0.010	0.065
74/03/15	10 45		0.368	0.300	0.015	0.015	0.035
74/04/19	11 40		0.940	1.000	0.015	0.025	0.080
74/05/26	14 35		0.088	0.200	0.010	0.015	0.035

STORET RETRIEVAL DATE 76/03/30

1850D1
39 04 53.0 085 15 02.0 4
CEDAR CREEK
18 7.5 VERSAILLES
T/VERSAILLES 051892
BANK NEAR MOUTH WALK FROM END HASSMER RD
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/06/09	11 45		0.090	0.960	0.040	0.034	0.065
73/07/13	11 00		0.180	0.820	0.054	0.037	0.050
73/08/17	11 50		0.110	0.355	0.014	0.029	0.035
73/09/17	10 10		0.115	0.920	0.038	0.028	0.040
73/10/15	11 40		0.084	0.400	0.025	0.033	0.045
73/11/16	11 50		0.240	1.200	0.035	0.012	0.092
74/01/17	15 20		0.750	0.300	0.072	0.044	0.075
74/01/29	11 00		0.810	0.100	0.005	0.010	0.051
74/02/15	11 20		1.260	1.100	0.075	0.060	0.145
74/02/20			1.440	1.900	0.210	0.077	0.195
74/03/15	10 30		1.400	0.800	0.040	0.085	0.160
74/04/19	11 20		0.552	1.100	0.045	0.015	0.050
74/05/26	14 20		0.128	0.250	0.025	0.015	0.037

STORET RETRIEVAL DATE 76/03/30

1850XA TF1850XA P001500*
39 07 52.0 085 16 50.0 4
OSGOOD
18 7.5 OSGOOD
T/VERSAILLES LAKE 052192
NO NAME DITCH/LAUGHERY CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/06/23	10 30		0.130	10.000	2.700	4.500	5.200	0.200	
73/09/18	11 00		3.635	17.600	5.230	6.360	8.200		
74/01/24	14 00		2.880	21.000	0.150	1.440	3.700	0.150	
74/05/05	12 00		0.840	23.000	3.000	2.100	4.300		

STORET RETRIEVAL DATE 76/03/30

1850AC AS1850AC P004000
39 18 18.0 085 14 15.0 4
BATESVILLE ACTIVATED SLUDGE
18 RIPLEY COUNTY
T/VERSAILLES 051392
LITTLE LAUGHERY CREEK
11EPALES 2141284
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/06/08 07 00 CP(T)- 73/06/08 17 00			7.200	5.400	0.390	16.550	17.600	0.354	0.270
73/07/09 07 00 CP(T)- 73/07/09 17 00			8.400	2.800	0.180	4.200	4.800	0.157	0.370
73/08/08 07 00 CP(T)- 73/08/08 17 00			11.000	2.600	0.250	17.300	18.670	0.189	0.210
73/09/10 07 00 CP(T)- 73/09/10 17 00			12.400	2.900	0.570	13.000	14.700	0.280	0.240
73/10/03 07 00 CP(T)- 73/10/03 17 00			7.400	7.400	0.280	12.000	20.000	0.200	0.220
73/11/08 07 00 CP(T)- 73/11/08 17 00			6.700	4.700	0.270	21.000	21.000	0.250	0.230
73/12/06 07 00 CP(T)- 73/12/06 17 00			6.500	2.600	0.070	19.750	19.950	0.180	0.250
74/01/09 07 00 CP(T)- 74/01/09 17 00			8.900	2.200	0.690	18.000	19.500	0.280	0.250
74/02/14 07 00 CP(T)- 74/02/14 17 00			1.040	11.000	2.000	21.000	23.000	0.210	0.240
74/03/07 07 00 CP(T)- 74/03/07 17 00			2.320	6.600	0.230	15.700	15.700	0.320	0.300
74/04/04 07 00 CP(T)- 74/04/04 17 00			3.400	2.200	0.130	9.700	10.500	0.350	0.420
74/05/07 07 00 CP(T)- 74/05/07 17 00			7.300	3.300	0.250	16.000	18.000	0.260	0.320

STORET RETRIEVAL DATE 76/03/30

1850AB TF1850AB P004000
39 18 30.0 085 13 00.0 4
BATESVILLE
18 RIPLEY CO MAP
T/VERSAILLES LAKE 051392
LITTLE LAUGHERY CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/06/08	07	00							
CP(T)-			8.100	3.500	0.160	20.100	23.000	0.380	0.350
73/06/08	17	00							
63/07/09	07	00							
CP(T)-			4.500	6.400	0.580	4.200	6.000	0.250	0.430
73/07/05	17	00							
73/08/08	07	00							
CP(T)-			5.900	8.750	0.980	29.000	30.000	0.320	0.360
73/08/08	17	00							
73/09/10	07	00							
CP(T)-			9.200	10.000	1.040	15.200	16.800	0.220	0.250
73/09/10	17	00							
73/10/03	07	00							
CP(T)-			11.800	7.150	1.600	11.600	30.000	0.240	0.210
73/10/03	17	00							
73/11/08	07	00							
CP(T)-			5.600	13.000	2.940	32.000	32.250	0.200	0.200
73/11/08	17	00							
73/12/06	07	00							
CP(T)-			6.000	8.200	0.350	36.000	37.000	0.240	0.260
73/12/06	17	00							
74/01/09	07	00							
CP(T)-			3.300	9.700	1.560	25.200	27.000	0.230	0.220
74/01/09	17	00							
74/02/14	07	00							
CP(T)-			5.300	9.100	1.300	27.500	30.500	0.230	0.220
74/02/14	17	00							
74/03/07	07	00							
CP(T)-			5.040	7.700	0.330	20.500	24.000	0.310	0.290
74/03/07	17	00							
74/04/04	07	00							
CP(T)-			5.880	1.400	0.130	15.000	18.000	0.400	0.320
74/04/04	17	00							
74/05/07	07	00							
CP(T)-			6.700	6.900	0.150	24.000	27.000	0.350	0.380
74/05/07	17	00							